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Is the Traditional Rural Architecture in the Periphery of Istanbul Climate-Friendly? The Case Study of Şile, Gökmaslı

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Abstract
Nowadays, the decrease in available resources due to excessive use and the deterioration of ecological balance have revealed the necessity of developing approaches compatible with nature for the whole world. The effects of these approaches have been seen for a long time in the construction industry, which constitutes a significant part of energy consumption, and therefore in the field of architecture. There is an increasing environmental awareness not only of the design and implementation phases of new buildings but also of reconsidering existing historical rural settlements built according to natural and climatic conditions in the past. This paper aims to verify/falsify the theory that it would be beneficial to protect and sustain the traditional rural architectural heritage in combating the negative effects of the climate crisis, which is widely accepted in the literature. Another line of questioning in this research is to what extent the ecological design criteria, which have come to the fore in recent decades in the context of new buildings to be built, differ or overlap with traditional architectural principles. In this context, the sustainable design criteria suggested in the literature were compiled and a line of inquiry specific to historic rural settlements was reached. These criteria were questioned in-depth on a case, which have rural heritage value. Accompanying the literature and archival research, field studies were conducted in the summers of 2023 and 2024, to understand the rural landscape and traditional architectural character. The existing physical environment in the Gökmaslı rural settlement of the Şile district on the urban periphery of Istanbul was examined in terms of ecological sustainability, and the possible contributions of the preservation of historical settlements to climate adaptation studies are discussed.
Keywords: Sustainability; Rural Architecture; Climate Adaptation; Conservation; Ecological Architecture

1. Introduction, Methodology, and Theoretical Framework

The modernization of the world, technological developments, and consumption habits have global impacts on the world's ecosystems Amen, 2021; Amen et al., 2023; Barone, 2023. The daily depletion of resources and the negative effects of climate change on almost every aspect of life have led to studies on how to change the direction of the current course. The concept of "sustainability", which emerged in this context, is vital for the continuity of all living and non-living ecosystems. According to the Brundtland Report organized by the World Commission on Environment and Development (WCED) in 1987, the concept of sustainability, which can be defined as meeting the needs of the present without creating any obstacles to the potential of future generations to meet their own needs, has started to be adapted to all areas of life.

The effects of the concept of sustainability are also seen in the building sector, which has an important share in the human-environment relationship by constituting a large part of natural resource use and energy consumption. Efforts to support the ecological balance through design have brought the concept of "sustainable architecture" to the agenda.

Nowadays, rapid urbanization, population growth, and wrong urban policies resulted in unqualified and unplanned construction, unhealthy environmental conditions, and unnecessary use of resources, which led to a reinterpretation of architectural practice (Ovalı, 2009: 2). As a result of these inquiries, "sustainable architecture principles" aiming to provide appropriate comfort conditions for users by minimizing the damage to the environment have been tried to be determined and implemented. The concept of sustainable architecture is based on mutualist approaches that try to balance humans, the built environment, and nature. The ecological design phenomenon that emerged in this context includes sub-headings such as energy-efficient buildings, clean energy use in buildings, rehabilitation of existing buildings, and use of environmentally compatible and recyclable materials (Ovalı, 2019: 2-3).

It is seen that the protection of historic rural settlements built by local people centuries ago, together with the principles of sustainable architecture, which are brought to the agenda during the design and construction phase of contemporary buildings, comes to the fore more frequently nowadays in combating the climate crisis. Traditional settlements, which can adapt to changing times and conditions, constitute a sample for examining sustainability (Kürüm, 2021: 287). With the search for sustainable design, which intensified especially in the 20th century, the adaptability of traditional knowledge is emphasized in the forms of construction and mass compositions of buildings.

It is also important for future generations to preserve and maintain the ways of doing things in harmony with nature and with the least damage to the environment in historic rural landscapes that harbor the collective

memory of settlement and society. In the "sustainable conservation and growth" approach, which Okumuş and Altınöz (2018:518-519) state that cultural landscapes should be handled together for the continuity of cultural landscapes, it is suggested that all components that make up the built and natural environment should be seen as a whole and can be protected and maintained with strategies to be produced in line with the needs and expectations of users. Conservation strategies in cultural landscapes are not only concerned with ensuring the continuity of the existing environment without changing it but also with the management of possible changes. In the management of change, there is a need for multidimensional approaches in economic, ecological, and social terms such as protecting and improving the integrity of the ecosystems forming the landscape areas without preventing development, increasing economic efficiency, ensuring user satisfaction with social egalitarian approaches and increasing the quality of life (Çöteli, 2010: 80-81).

This paper aims to verify/falsify the theory that principles of traditional rural architecture are climate-friendly, which is widely accepted in the literature (Correia et al., 2014; England, 2020; Change, 2019). Starting from this point of view the ecological design criteria suggested in the literature were compiled and a line of inquiry specific to historic rural settlements was reached (Figure 1-2). These criteria were questioned in-depth on a case, which have rural heritage value.

The principles of sustainable architecture are based on approaches such as reducing the negative impacts on nature, reducing the need for energy, efficient use of resources, selecting renewable resources, and protecting the social and cultural values of the regions by protecting these values.

Figure 1. The compilation of the ecological design criteria.

Within the scope of this study, the principles of sustainable architecture are classified into two main groups "adaptation to the environment and climate" and "efficient use of energy and resources". The sub-criteria under the title of "adaptation to the environment and climate" are analyzed into two groups as settlement and building scale.

The principles of sustainable architecture, which are classified under two sub-groups as "appropriate positioning, site selection and adaptation to topography" and "adaptation to the natural landscape and vegetation" at the settlement scale, are examined under four sub-headings as "building form", "orientation and space organization in buildings", "positions of buildings relative to each other / building spacing" and "building envelope" at the building scale.

In this research, in which the relationship between the concepts of sustainability and climate adaptation with rural settlements and the guiding effects of site-specific data on traditional settlements are examined, Gökmaslı Neighbourhood, a historic rural landscape in Şile district of Istanbul, has been selected as the study area. The selection of Gökmaslı as the study area was influenced by the fact that the settlement has natural, historical, and cultural values that have remained authentic despite being located on the periphery of a large metropolis such as Istanbul. Within the scope of the study, the settlement texture was tried to be understood by carrying out literature and field studies together through the line of inquiry created by considering the principles of sustainability (Figure 1). In the field study, analyses, inventory studies, architectural surveys, as well as oral history studies with local people were carried out to document the physical texture of the settlement. With the help of these data, the pros and cons of the traditional landscape in terms of climate adaptation were discussed.

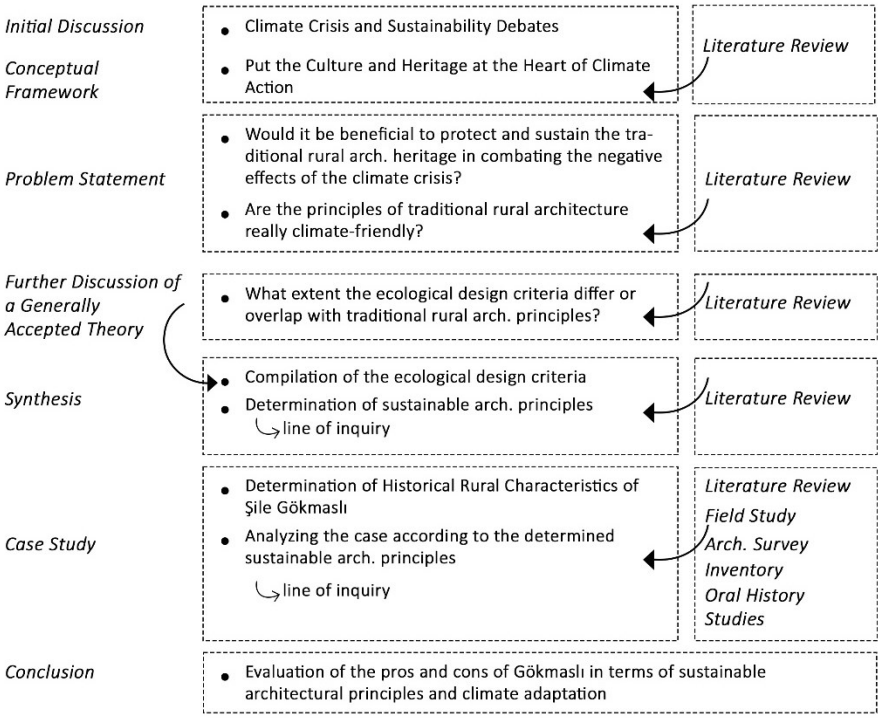


Figure 2. Methodology of the Study

2. Şile-Gökmaslı Historic Rural Landscape and Architectural Heritage

Gökmaslı (Village) Neighbourhood, is a traditional immigrant rural settlement located in the Şile district of Istanbul with its natural beauties, and historical and cultural values that have not lost their original texture (Figure 3). Gökmaslı is located on the Black Sea coast of the Kocaeli Peninsula in northwestern Turkey, approximately 70 km from Istanbul city center.

With a surface area of approximately 5 km², Gökmaslı was built on a terraced plain with an average height of 60 meters west of the Göksu Stream (Bali, 2022:608). This strategic location ensured that the settlement was not affected by the floods caused by the Göksu Stream throughout history (Bali, 2022:608). The geomorphological character of the settlement is shaped by the alluvial plain formed by the Göksu Stream to the east and the qualified forests and plateaus to the west (Bali, 2022: 608).

Located on the periphery of Istanbul, a major metropolis, the Gökmaslı landscape embodies many heritage values with its forested areas that make up the majority of the settlement, its natural environment associated with the Göksu stream and the surrounding mountainous areas, its agricultural lands shaped by traditional and modern production practices, and its built environment that is part of its original rural architecture. The historic rural landscape layers of Gökmaslı are categorized into three main groups: natural, agricultural, and built environment (Figure 4). The natural environment includes "forest areas", "rivers and river views", "mountains and mountain views" and "special fauna and flora species", the agricultural environment includes "fruit (apple, hazelnut) orchards", "vegetable gardens" and "greenhouses", and the built environment includes "protected areas and archaeological values", "traditional built environment" and "modern settlement" (Figure 4). Intangible heritage values are defined as "religious, mythological, traditional and customary references".

Figure 3: A view from Gökmaslı (Url-1)

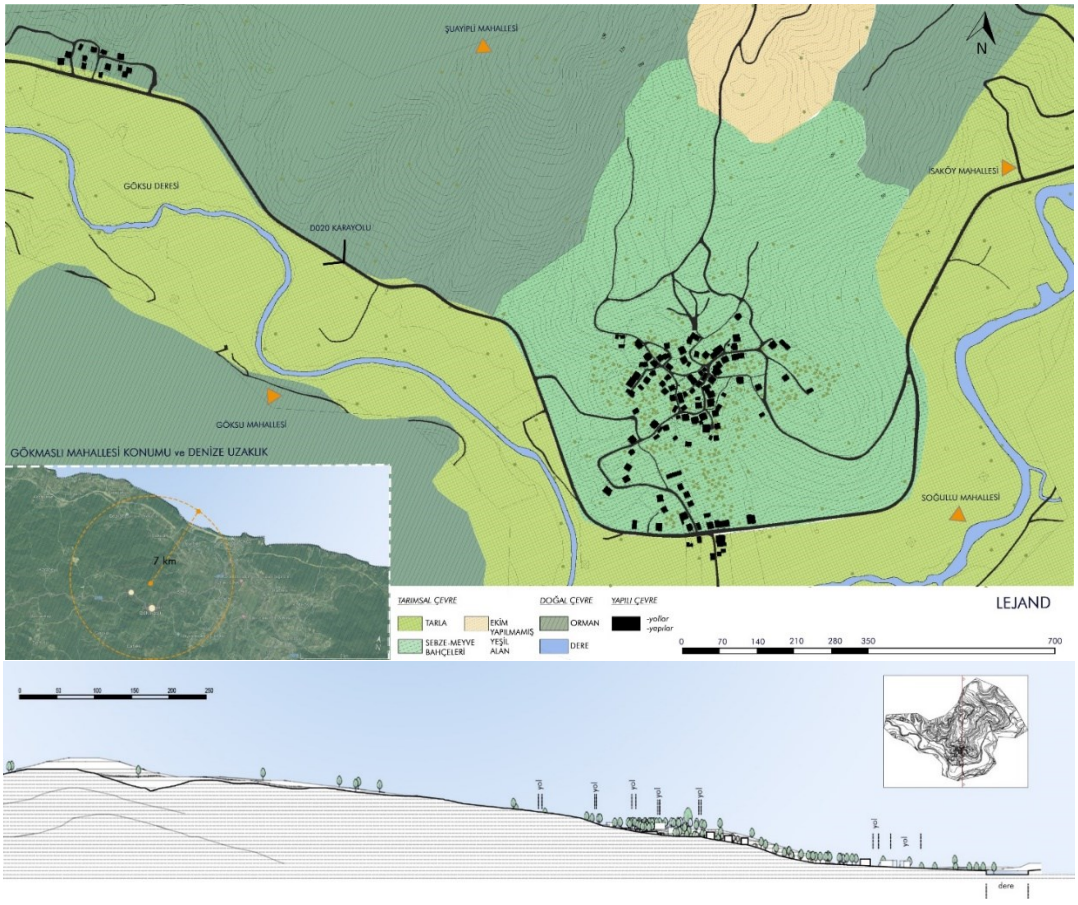


Figure 4: Landscape Character Analysis of Gökmaslı Historic Rural Landscape and Land Section (North-South Orientated) (İme, 2023).

Şile-Gökmaslı Rural Architectural Heritage

The settlement pattern of Gökmaslı, which is a rural landscape bordered by the D020 highway and Göksu Stream in the south, consists of traditional houses and contemporary buildings that are integrated into the built environment in the process. In addition to the residences, the mosques, social and commercial buildings, road texture, and fountains and ovens scattered throughout the village constitute the built environment and also elements that make up the natural and agricultural environment, such as fields, gardens, and forest areas, together create the traditional rural texture (Figure 3).

Gökmaslı District is an organic settlement extending towards the forest foothills in the northern part of the D020 highway, which runs along the east-west axis of the land. The buildings are mostly located adjacent to the gardens or in harmony with the land. There are also single-story auxiliary structures such as woodsheds and warehouses located adjacent to or separately from the buildings, which are generally built at two-story height. The buildings constructed in the last 30 years in the settlement are generally concentrated around the main road towards the southern axis of the settlement. Although the mass compositions of the contemporary buildings added to the settlement are largely compatible with the traditional texture, they differ in terms of construction techniques. The settlement has a topographically sloping land that increases as you move north (Figure 4). The building blocks that make up the settlement are positioned gradually towards the south, in harmony with the topography. Due to the sloping terrain, building entrances are generally provided from different elevation levels.

It can be said that the majority of the buildings consist of buildings with direct access from the street and backyards. In buildings where entrance is provided by passing through a garden, it is seen that the entrance is generally provided from the facade facing the street, and in some examples, the facade perpendicular to the street is used for entrance. Although in most of the parcels, the main garden of the building is at the back or to the side, in some parts the entire garden is in front of the building. As another settlement element that allows us to obtain information about traditional rural life, gardens are small-scale agricultural areas where people plant fruits and vegetables for their individual needs (Figure 4).

The majority of the buildings in the settlement built using traditional construction techniques are residences. In addition to residences, auxiliary structures such as warehouses, woodsheds, barns, ovens, fountains, mosques, grocery stores, and coffee houses are other types of buildings that make up the traditional texture.

Houses were emerged in line with the lifestyles and needs of the people in the region, considering the geographical conditions and climate characteristics of the region, and were built using the common structure and mastery knowledge. Traditional houses in Gökmaslı are basically in two different typologies: independent and adjacent/twin structures in a separate order. While the ground floors are reserved for spaces where daily work is carried out, such as the entrance (known as “taşlık” in traditional terminology), stable, warehouse, and kitchen, the rooms defined as living spaces and the sofa are located on the upper floor. It is seen that semi-basement floors with low ceilings are built in some buildings in areas with high slopes.

The facade formations of the houses in the settlement can be interpreted as the external reflection of the plan fiction. Building facades are simple and unpretentious throughout the region, and the facades gain character with semi-open or closed projections in direct proportion to the movements in the plan.

For traditional buildings, most of which are built with a wooden frame construction system, the structure, which includes belts and struts on the horizontal axis and wooden struts supported by these elements on the vertical axis, is placed on a wooden base beam. Openings are created using belts and pillars for window and door openings determined in line with the plan layout. The masonry stone walls, which serve as the foundation, are raised slightly above the road level to form a sub-base. By placing the wooden frame on this foundation wall, the contact surface with the ground was reduced and it was ensured that it was not affected by moisture.

3. Analyzing the Conservation of Şile-Gökmaslı Historic Rural Landscape in Terms of Climate Adaptation

Considering the natural environmental factors such as the topographic and climatic characteristics of the land on which they are located, the preservation of traditional settlements built in line with the cumulative knowledge and experience dating back centuries constitutes an important reference for the understanding and adaptability of sustainable architecture practices.

In this part of the study, Gökmaslı settlement was examined under three main headings, namely "adaptation to the environment and climate", "effective use of energy and resources" and "social, economic, cultural perceptions and functional status" and subheadings related to these headings, in terms of climate adaptation and sustainability, has been evaluated.

3.1 Adaptation to the Environment and Climate

In traditional architecture, where nature conservation and environment-climate harmony approaches are centered, the geographical features of the region, local material resources, climatic conditions, and lifestyles of the people have a great impact on the planning decisions of residential buildings, which constitute a large part of the built environment. Located at 41° 5’ north latitude and 29° 48’ east longitude, Şile district, to which Gökmaslı District is affiliated, shows a transitional feature between the Mediterranean and Black Sea maritime climates, with the hottest period being hot and less dry, and the coldest period being cold and rainy (Evren and Ertek, 1997:47). The average annual humidity rate in the district, where the effect of the Black Sea climate is observed, is between 70-80% (Url-2). The dominant wind direction in the region is the winds coming from the north. According to the number of wind blows, the Northeast effect is mostly seen during the year, blowing from the northeast direction. While the northern wind creates a cooling effect inside the settlement in the summer months, it causes frost formation in the winter months (Evren and Ertek, 1997:47-48).

Examination at Settlement Scale,

3.1.1 Appropriate Positioning, Site Selection, and Adaptation to Topography

Gökmaslı settlement was not affected by stream floods over time due to its location above the stream level and exhibited a climate-compatible approach. As a result of the settlement compatible with the land, existing buildings do not block each other's views and geographical advantages, and are also perceptible within the slope (Figure 5). Level differences in the settlement due to the sloping land structure played a decisive role in the mass formation of the buildings. Building forms were shaped in harmony with the topography, without major interventions on the land. For Gökmaslı, which has climatic characteristics where summers are hot and partially dry and winters are cold and rainy, the fact that the settlement pattern starts from the slope and extends towards the ridge shows that the topography is used correctly by the climate (Figure 5).

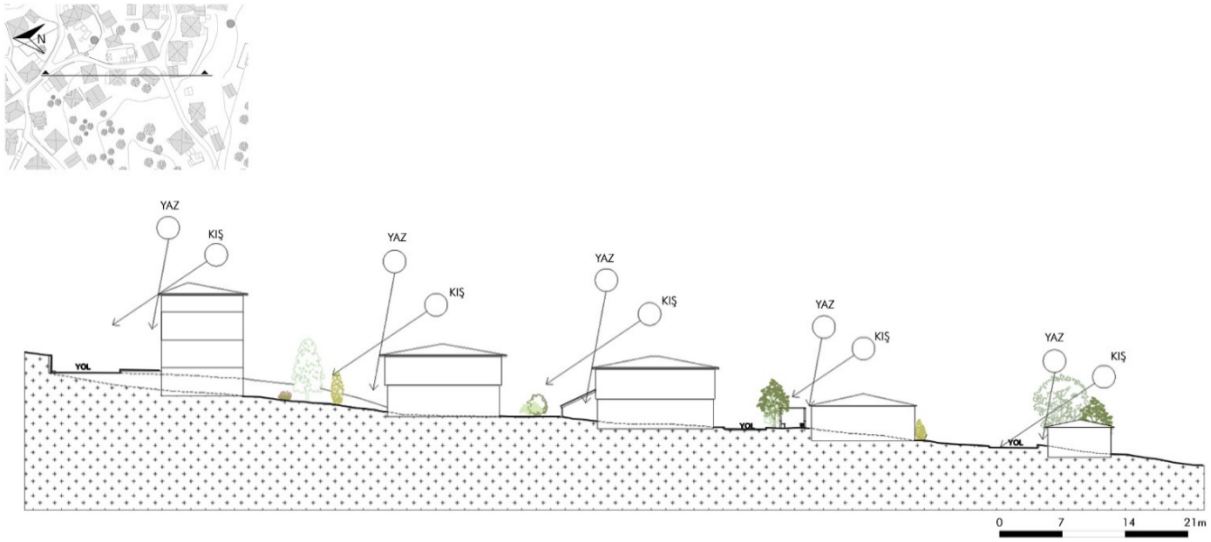


Figure 5: Residential Buildings Positioned According to Land Slope (İme,2023)

3.1.2 Adaptation to Natural Landscape and Vegetation

It can be said that Gökmaslı, which adopts an approach that does not open agricultural areas with fertile soil to construction in the traditional approach, contributes to sustainability because it has an understanding that is compatible with the natural landscape and vegetation and respectful of the green texture.

Examination at Building Scale,

Within the scope of the study, all buildings in the settlement were documented through inventory studies carried out during field studies. Specific to traditional buildings, survey studies were prepared, and plan typologies were created. The traditional buildings in the settlement were examined within the scope of sustainable architecture principles and inferences were made.

3.1.3 Building Form

The residential buildings placed on the land in the northeast-southwest axis generally have a rectangular form. Due to the sloping topography conditions, the ground levels of the houses with direct entrances from the street are reached by several steps created from the street level. Residential buildings are generally designed to have 2 floors and the normal floor height is approximately 3 meters. The heights of the ground floors are generally kept lower to adapt to the terrain and reduce the need for heating. While their width is approximately 3 times the floor height for single houses, this ratio is much smaller in attached-twin houses. Efforts have been made to increase the use of sun, view, and wind through closed or semi-open projections throughout the floors of the buildings. In the settlement, which has high humidity and rainy cold periods, hipped and gable roofs were preferred as the top cover and eaves widths were kept at approximately 50 cm. Sun control is also provided with eaves.

3.1.4 Orientation and Space Organization in Buildings

In Gökmaslı settlement, the dominant wind according to the amount of blowing throughout the year is northeasterly. An attempt was made to reduce the amount of surface in contact with the wind by positioning the majority of the buildings with their short sides in the direction of the wind. Due to their protection and benefit from sun and wind orientations, houses placed at an angle can benefit from winter sun equally and benefit from natural ventilation (Figure 6).

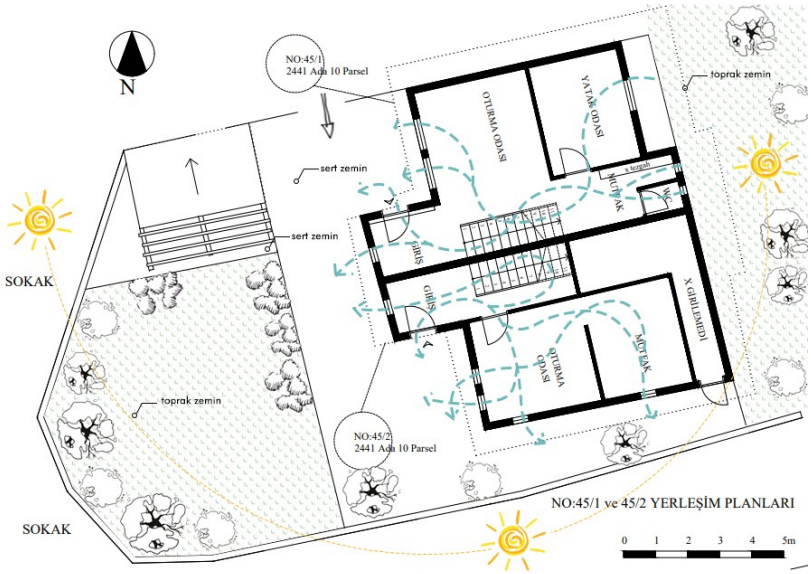


Figure 6: Adjoining Twin Building Example; building form, environment, utilization of sun and wind

In the Gökmaslı settlement, an introverted plan was created, considering the climatic conditions in the region. A plan analysis was made that defined single houses as having an inner corridor (which is known as a "sofa" in traditional buildings) and twin houses as a side corridor (sofa). This plan analyzes reducing the effect of heat on interior spaces in summer and keeping it inside the building in winter. In traditional houses where heating is provided by stoves, which is only located in some of the rooms. This enables the use of rooms with stoves for the periods when heating is required and the seasonal use of the spaces, thus reducing the need for fuel and the pollution it creates. To prevent heat loss, stoves are positioned adjacent to the interior walls, usually in the middle axis of the wall. When evaluated in terms of space sizes, it can be said that unnecessary use of space was avoided for Gökmaslı settlement, and the area/volume ratio was kept at optimum by considering the climatic conditions.

The spatial organization of buildings has a determining role in many sub-criteria such as sun utilization or avoidance, prevailing wind direction and natural ventilation, material selection, energy consumption, and expenses (Zor, 2012:44). The spatial organization of traditional buildings in Gökmaslı settlement was evaluated under two subheadings: "natural ventilation and wind" and "solar utilization/solar control".

3.1.4.1 Natural Ventilation and Wind

Natural ventilation, achieved by the correct positioning of buildings and correct planning of their openings, is an important in balancing user health and indoor thermal comfort conditions (Afara et al., 2024; Amen et al., 2024. Considering the amount of energy consumed by active ventilation systems (HVAC) and the aesthetic pollution it creates, the wind is a clean renewable resource that should be used effectively in building designs (Zor, 2012:47). The openings planned in the space configuration of the residential buildings of Gökmaslı settlement are architectural elements that are effective in providing comfort conditions such as thermal balance, ventilation and lighting for the buildings. Mutually positioned openings provide air circulation and cross-ventilation within the space. The fact that the wind penetrates the settlement and building interiors during the hot summer months through natural ventilation and creates a cooling effect is effective in achieving thermal comfort conditions. It has been observed that the most closed facades in Gökmaslı residential buildings are the northern and eastern facades to reduce the effect of the prevailing northeast wind.

3.1.4.2 Solar Utilization/Solar Control

In the Gökmaslı settlement, roofs with wide eaves were preferred, allowing the sun's rays to reach a more limited area inside, especially on hot summer days, and at the same time, efforts were made to create a shadow area for the lower floors and the street. Projections that save space on the upper floors also offer users the opportunity to watch the view and the street. The openings on the upper floor facades, which extend to the street in the form of overhangs, facilitate the intake of sunlight into the interior and enrich the street perspective. It is seen that the projection and view orientations of the buildings in the settlement are mostly towards the south and southwest, the seating and living spaces are mostly designed in the south direction, and the less used spaces such as latrines and bathrooms are mostly located on the north and east facades (Figure 7).

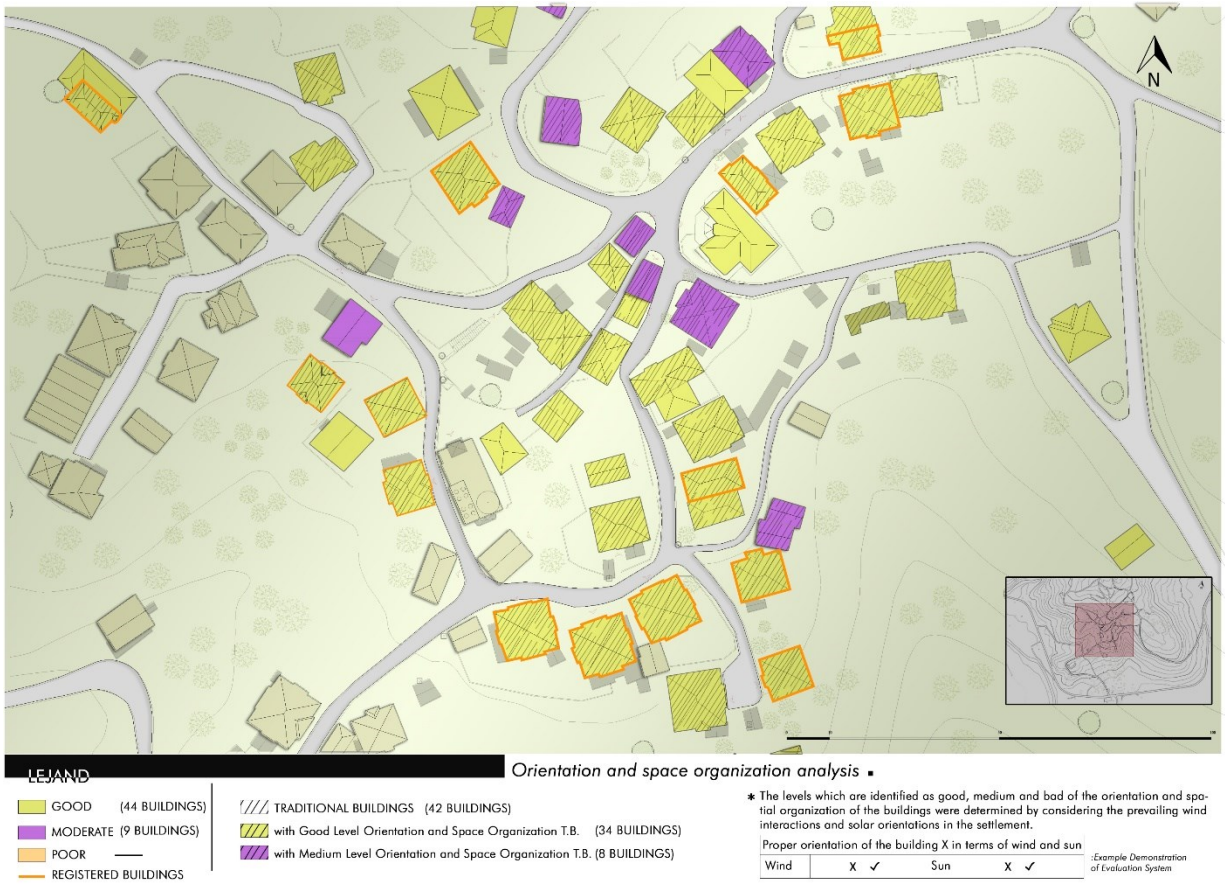


Figure 7. Orientation and space organization analysis.

3.1.5 Positions of Buildings Relative to Each Other / Building Spacing

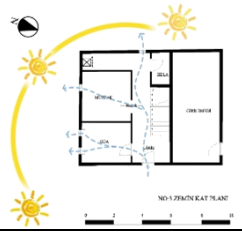
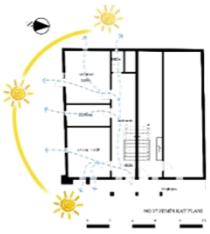
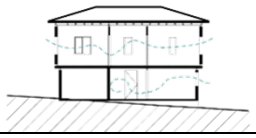
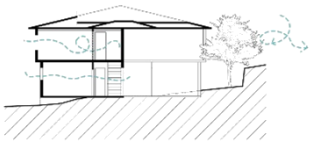
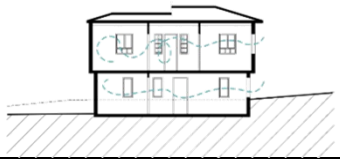
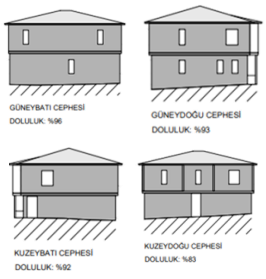
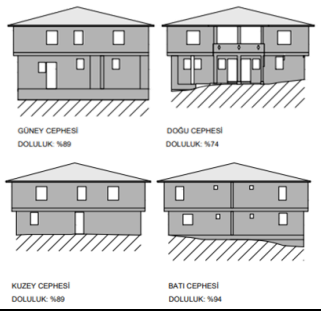
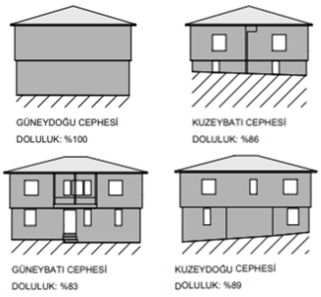
The buildings that form the traditional settlement pattern of Gökmaslı generally consist of two-story twin or single houses. Twin houses, created by dividing single houses along the axis of symmetry passing through the middle of the building, are adjacent to the symmetrical building. Individual houses are generally positioned in a separate order within the settlement. The buildings are placed scattered on the sloping topography to meet the slope. It is observed that the density of the settlement increases as the slope increases along the slope. This positioning style has been considered appropriate in terms of not preventing the buildings from benefiting from climatic factors such as sun and wind.

3.1.6 Building Envelope

The wall that forms the boundary between indoor and outdoor conditions in buildings is called the building envelope. The indoor thermal balance of buildings varies depending on the insulation and permeability coefficients of the elements that make up the mass formation of the building. It can be said that the use of materials with low thermal conductivity, such as stone and wood, in traditional residential buildings in the settlement is effective in providing thermal comfort conditions.

The traditional building dimensions in Gökmaslı settlement have simple geometric formations. Architectural elements such as walls, windows, and doors, which form the solid-empty layout of the building envelope, are considered to be effective factors in the amount of energy needed for functions such as interior lighting and ventilation. It is seen that the occupancy rates of the northern and eastern facades of the buildings throughout the settlement are higher than the southern and western facades, with the eastern facade being the most closed façade, and fewer and smaller window openings are preferred on these facades to reduce thermal permeability against the prevailing northeast wind (Table 1).

Table 1: Housing Review, No: 3, 17 ve 2

Study Case	No:3	No:17	No:2
Plan			
Garden Type	Backyard	Side Garden+ Backyard	Front Garden
Plan Typology	Detached	Attached/Twin	Detached
Section			
Orientation	Northeast (street oriented)	East (street oriented)	Southwest (street oriented)
Number of spaces/Ground Floor	Entrance(Taşlık)(1)+Room(1)+Kitchen(1)+Latrine (Hela)(1)+ Inaccessible Area(1)=5	Entrance (Taşlık)(1)+Room(2)+Kitchen(1)+Latrine(Hela)(1)=5	Entrance (Taşlık) (1)Room(2)+Kitchen(1)+Latrine (Hela)(1)+Stable(1)=6
Number of spaces/First Floor	Room(4)+Latrine(Hela)(1)+Sofa(1) +Inaccesible Area(1)=7	Room(3)+ Latrine (Hela)(3)+Kitchen(1)+Sofa(1)+Balcony(1) =9	Room(4)+Latrine(Hela)(1)+Sofa(1)=6
Indoor Space Area/Ground Floor	71 m²	65.9 m²	70.5 m²
Indoor Space Area/First Floor	78 m²	75.5 m²	72.7 m²
Facade Material	Stone, Brick,Wood	Wood, Stone, Later-term Concrete Addition	Wood, Stone
Facade Occupation			

3.2 Efficient Use of Energy and Resources

Efficient use of energy and resource management constitute one of the most important stages of ecological building design. The construction sector, which is one of the sectors that need energy the most; is held responsible for a large proportion of global carbon emissions, raw material use, and waste production. This situation revealed the need to reconsider the relationship between structure and energy consumption according to ecological criteria. To ensure environmental sustainability, the energy efficiency of buildings must be reviewed in detail throughout their life cycle, from the design stage to the application, use, repair, and recycling stages. Efficient use of energy and resources is discussed under three headings: "effective use of energy", "effective use of water" and "appropriate sizing, material-saving design, and construction, use of local materials, use of recycled materials".

3.2.1 Effective Use of Energy

While there is no use of non-renewable energy resources such as oil and natural gas in the traditional settlement of Gökmaslı, it has been reported by the local people that a small amount of coal has been used for heating purposes in recent years. The wood used as fuel material is provided with state support and supervision from tree species such as oak, beech, and chestnut in the forests near the settlement. Compared to fossil energy sources, wood is considered a renewable energy source that harm less the environment. However, it can be predicted that increasing the use of wood as an energy source will cause it to lose its "renewable" feature over time (Özkaya, 2004). Today, it is observed that active energy systems used for heating and cooling purposes, using solar energy, a renewable energy source, have been integrated into the traditional buildings in the Gökmaslı settlement. Solar collectors placed on building roofs at an angle that can benefit from the sun most efficiently can be used to heat water, contributing to meeting domestic hot water needs and reducing energy consumption for heating purposes. Another need for energy during building use is lighting. Oil lamps and gas lamps, which were used for illumination in the early periods of the traditional buildings in the settlement, have now been replaced by artificial lighting elements. By positioning the openings in the right places in building designs, heat loss is tried to be prevented, and on the other hand, the electrical energy consumed by artificial elements is saved by providing maximum benefit from daylight.

The amount of energy used to supply the necessary materials during the construction of traditional buildings in the settlement is quite low due to the use of local materials. Wooden materials were obtained from trees in the forest areas, which constitute the majority of the region, and materials such as adobe and bricks were produced by the local people with materials found in the region.

3.2.2 Effective Use of Water

Protecting water resources, which are rapidly depleted and polluted as a result of incorrect and unnecessary use, and efficient use of water are critical points in terms of ensuring ecological continuity. The construction sector, which has a 78% share in global water consumption as a result of internal and external use, is trying to develop various innovative approaches to ensure the efficient use of water (Dullinja, 2017:46). Practices such as reuse of rainwater and wastewater (grey water) are among the efforts to ensure the effective use of water in buildings.

It is seen that there are no gutters in the original structures of traditional Gökmaslı houses, and gutters and rainwater downpipes were added to the buildings later. The rainwater collected in the gutters is discharged to the street or garden using pipes. It has been observed that in some buildings rainwater is collected by placing a bucket or canister in line with the rainwater downpipes, but no rainwater collection system has been found in the settlement. No use of gray water for recycling wastewater was observed within the settlement.

3.2.3 Appropriate sizing, material-saving design, and construction, use of local materials, use of recycled materials

In the traditional settlement of Gökmaslı, there are buildings shaped in simple geometric shapes, with space in numbers and sizes according to need, and without exaggeration and excess. This modest approach to dimensioning is considered ecologically positive as it reduces the need for materials and energy for construction (Figure 8). The main materials used in traditional buildings are materials obtained from the settlement such as stone, soil/adobe, and wood. These materials, used in the building system or as building components, are recyclable. Stone and soil/adobe materials used in buildings whose life cycle has been completed can be used in road coverings or as foundations, garden walls, or filling material for another structure after the building is demolished. The wood material that emerges after the demolition is used as fuel. Although many buildings in the settlement, which were built many years ago, have been exposed to many destructive physical factors, they have survived to the present day due to the preference for local materials that provide robust and long-term use.

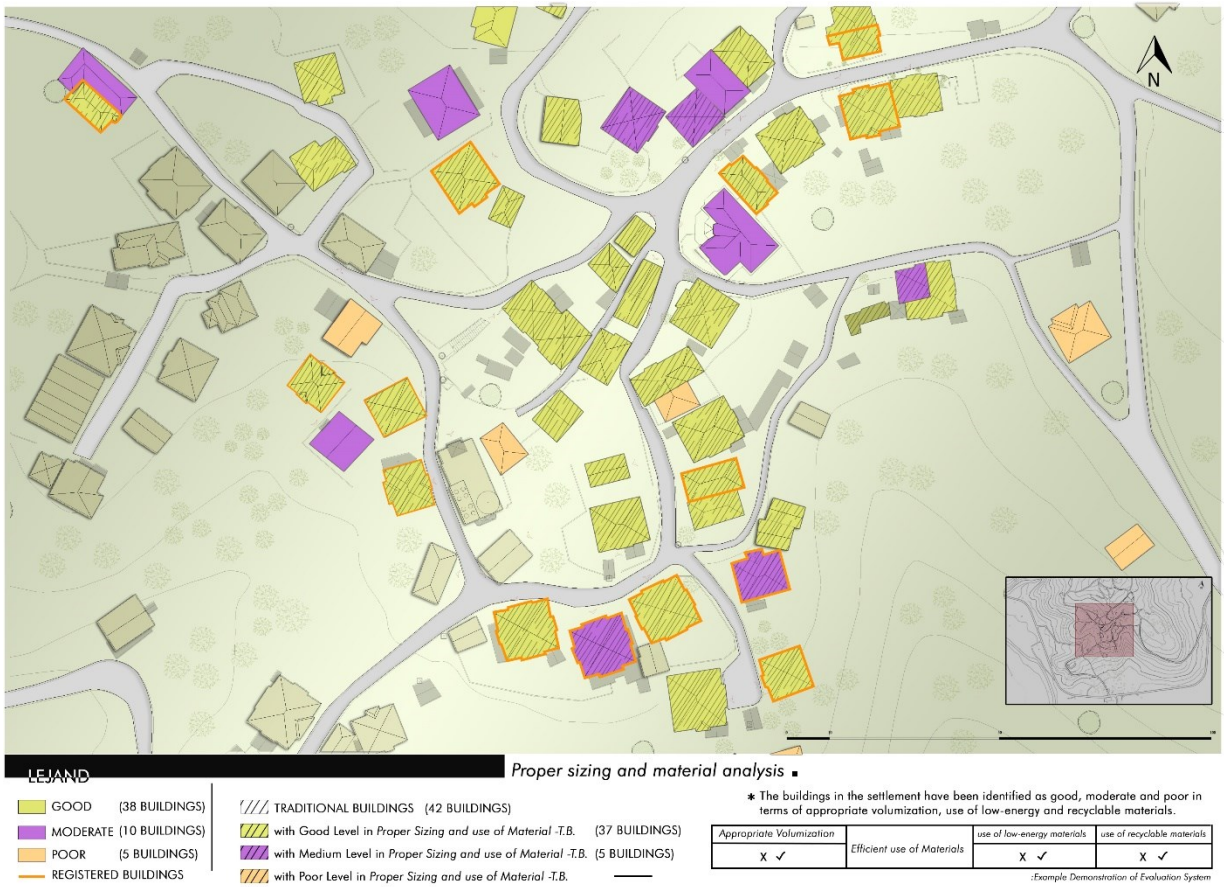


Figure 8. Proper sizing and material analysis.

4. Conclusion

While the application of the concept of sustainability in architecture starts from the design phase for new buildings and progresses in a planned process with the support of technology, the fact that similar applications were carried out centuries ago using traditional mastery has pointed out that there are lessons to be learned from traditional buildings. Rural landscape areas, which contain tangible and intangible heritage created by the unity of humans and nature over time, such as traditional buildings, can be considered study areas for different sciences in many aspects. Today, cultural landscape areas, mostly stuck on the periphery of urbanization, remain vulnerable to the threats posed by high-scale decisions taken in line with investment strategies and economic profit-oriented tourism activities, far from the understanding of conservation. Studies to be carried out to protect and ensure the continuity of rural landscape areas are considered important in terms of transferring the cultural heritage and the traditional knowledge contained in these heritage sites to the next generations.

It is accepted that traditional architecture, built by the people of the region in line with the conditions and lifestyles of the period, using the available resources of the region, forms the basis of the principle of sustainable architecture. The construction methods implemented by traditional architecture, which carries a unique memory with it, taking into account environmental factors such as climate, topography, wind, and sun, should be reconsidered with contemporary interpretations, and climate and user-friendly building production should be supported.

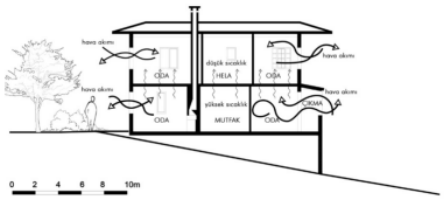
Fabrication production style and developing construction techniques lead to the loss of importance of traditional knowledge over time and the destruction of the traditional fabric, which can no longer meet the requirements of modern life. The traditional fabric, which has begun to be abandoned over time due to socioeconomic and cultural deficiencies, loses its intangible values as well as its tangible values, leaving behind a soulless building community that remains idle. When the energy spent during the preservation or re-functioning of existing buildings is compared with the amount of energy and resources spent in the process of building new buildings, it can be said that approaches to utilize the existing building stock produce healthier results in ecological terms. Therefore, re-functioning can be accepted as a suitable tool for the maintenance of the built environment, and sustainability can be expressed as a complementary concept regarding the continuity of historical environments (English Heritage, 2002 cited in Rahbarianyazd,2017:3). Work carried out within the scope of ensuring the sustainability of rural settlements should not be evaluated only at the building scale, but should be handled with holistic approaches and priority should be given to preserving the original texture of the settlement.

Within the scope of the study, Gökmaslı rural settlement in Şile district of Istanbul province was selected as the study area and determinations were made on the evaluation of the settlement in terms of climate adaptation and

sustainability. In conveying these determinations, technical drawings created for settlement and building plans were schematized.

Within the scope of the study, Gökmaslı settlement, which is a historical rural landscape area, was examined in terms of climate adaptation and sustainability, and it was aimed to understand the approaches to ecological design in historical textures through the settlement example. As a result of the analysis and evaluations, it was concluded that the rural settlement examined was built without any planning on paper, using traditional mastery and construction techniques, with an approach sensitive to climatic data and environmental conditions. When the results obtained for the traditional Gökmaslı settlement, which was examined through determined sustainable architecture principles, were compiled as a table, positive results were observed in 11 of the 12 criteria under the headings of "adaptation to the environment and climate" and "efficient use of energy and resources", but sufficient positive evaluation could not be made for the criterion of effective use of water can be expressed (Table 2).

Table 2: Gökmaslı Local Sustainability Assessment

Adaptation to the Environment and Climate	*At Settlement Scale*	Appropriate Positioning, Site Selection and Adaptation to Topography	✓	A compact built environment has been created by preferring less fertile soils higher than the stream level for settlement. Sensitive boundaries have been preserved with balanced distributions in the natural, agricultural and built environment. The dynamics of the settlement has been shaped to fit the terrain and slope without major interventions on the topography. Due to this shaping, it has been observed that the buildings in the settlement do not adversely affect each other's viewpoint or the opportunities to benefit from geographical factors. Figure: Use of lands with different slopes within the settlement: building no: 54, 34 & 20 
		Adaptation to Natural Landscape and Vegetation	✓	The dense forested areas towards the north of the settlement provide protection against wind and cold by forming a ridge to the buildings. Trees and landscape elements are utilised for solar and wind control. Cultivation of plants suitable for the settlement climate, such as hazelnuts, helps the efficient use of water. In Gökmaslı settlement, where agricultural areas are not opened to settlement as much as possible, it can be said that sustainable approaches in harmony with green are followed.
	At Building Scale	Building Form	✓	Generally rectangular traditional buildings are designed as 2 storeys. In the buildings shaped in harmony with the topography, it was observed that the floor height of the ground floors was kept low in order to utilise the slope and reduce the need for heating. It has been determined that sun, wind and climate control is provided with gable or hipped roof formation, sufficient eaves width and overhangs.
		Structure Orientation	✓	In Gökmaslı settlement, where the prevailing wind direction is northeast, the buildings are positioned on the northeast-southwest axis with their short sides in the wind direction. With this positioning, heat loss was tried to be reduced by reducing the surface area in contact with the wind. The houses, which are placed at an angle to the land, can benefit from the sun and wind effects sufficiently.  As a result of the examination carried out within the scope of the settlement, it was determined that 37 of the 40 traditional buildings had appropriate orientation conditions; It was determined that the orientation conditions of 3 buildings were not positive. *Yellow demonstrates the suitably locationed traditional buildings *Purple demonstrates the unsuitably locationed traditional buildings *Red frame indicates contemporary buildings which were built in later periods.
		Locations of Buildings Relative to Each Other/Building	✓	Houses in the traditional built environment consist of twin or single houses. Twin houses are adjacent to each other on the axis of symmetry, while single houses are mostly in a split order. The buildings positioned in harmony with the slope form an organic texture and do not negatively affect each other's ability to benefit from climatic factors (natural ventilation, natural lighting). The twin houses in adjacent order also provide thermal insulation to each other.
		Building Envelope	✓	In the building envelope of the traditional houses in the settlement, materials with low thermal permeability such as stone, brick and wood are used. When the full-empty layout is analysed, it can be said that the eastern and northern facades are more closed than the other facades considering the prevailing wind direction. It is observed that the window openings placed mostly in the south and west directions are approximately 2/3.
		Plan Organization	✓	*Space Organization: In Gökmaslı settlement, there is an introverted space organization that will balance the heat loss-gain situation. Plan analysis defined as an inner sofa in single houses and a side sofa in twin houses was applied. The venues are of sufficient size and number. Heating is provided by a stove and not every room has a stove. Space usage occurs depending on the season, and this contributes to the effective use of energy and resources.*
			✓	*Natural Ventilation: The locations and distances of the buildings relative to each other allow air flow. Cross ventilation is provided through mutually positioned openings in the buildings in the settlement. .*
			✓	*Natural Lighting: In the spatial setup of the buildings, living spaces used for longer periods are positioned in the south and southwest directions; It was observed that the openings on the north, east and northeast facades were kept fewer in number and smaller in size. In the settlement, where building entrances are mostly provided from the street, the view direction is south and large backyards are generally designed to face south. Efforts have been made to increase sun exposure through protrusions.*
Effective Use of Energy and Resources	Effective Use of Energy		✓	It is aimed to reduce the amount of energy and resources that will be needed during the use and construction of the buildings through efforts such as the determination of building forms and orientations in terms of design, occupancy-void ratios and material selection in the building envelope, and the creation of a plan fiction to make maximum use of natural ventilation and illumination. Priority has been given to providing the required energy from renewable sources. Solar and wind energy utilised through passive methods provide energy savings. Solar collectors placed on the roofs of buildings to utilise solar energy help to meet the need for hot water. It can be stated that Gökmaslı settlement meets the sustainability criteria with the use of clean and renewable resources and energy-saving design approaches.  Figure: Schematic Representation of Energy Efficient Space Organization of Gökmaslı Traditional Houses, Building no 8
	Effective Use of Water		✗✓	In the settlement, it is seen that the water accumulated in the roof gutters, which were added to the buildings later, is discharged to the street or garden through pipes and removed from the building. No rainwater collection system was encountered in the settlement, and no application for recycling grey water was observed. The fact that carrying water is used in the traditional gusulhanes instead of running water can be interpreted positively in terms of effective use of water. In the settlement, clean water supply is provided from the fountains located in the neighbourhood. The water mill structure that existed in the past was used for grinding grain.
	Appropriate Sizing, Material Saving Design and Construction, Use of Local and Recycled Materials		✓	Both spatially and massively, simple geometric shapes and need-sized solutions are used in the buildings. This dimensioning approach saves materials and energy to be used for construction and helps to reduce harmful effects on nature such as CO2 emissions and waste generation resulting from these activities. In general, local materials such as stone and soil are preferred in residential buildings where wooden construction systems are applied. Local materials used in buildings that have completed their life cycle are recycled and used in the construction of another building or landscaping.

Based on the studies conducted in the area, it was observed that out of the 130 buildings examined, 81 were traditional and 49 were contemporary buildings. The traditional buildings mainly used materials like wood, stones, and bricks sourced from the settlement or its nearby forests. 70 of these traditional buildings were constructed with wooden structures, while 11 were built using stone and wooden masonry. On the other hand, the contemporary buildings, totaling 49, predominantly utilized reinforced concrete construction, which became more popular in the latter half of the 20th century. When analyzing the "orientation and space organization," it was found that 82 percent of traditional buildings were correctly oriented, while contemporary buildings had a correct orientation rate of 78 percent, indicating a similar level of environmental design harmony compared to traditional buildings (Table 3).

Table 3: Orientation and Space Organization Analysis Data

		good	moderate	poor
orientation and space organization analysis:	***Traditional***	66	13	2
	Percentage (%)	82	16	2
	Contemporary	38	11	0
	Percentage (%)	78	22	0
Total(130 structures):	number of buildings	104	24	2
	Percentage (%)	80	18	2

In the "proper sizing and material" analysis, which was created by considering appropriate volumization, low energy, and recyclable material use, 95 percent of traditional buildings were evaluated as good. In comparison, only 4 percent of contemporary buildings could be evaluated as good, and 35 percent were accepted as moderately positive (Table 4).

Table 4: Proper Sizing and Material Analysis Data

		good	moderate	poor
proper sizing and material analysis:	***Traditional***	77	4	0
	Percentage (%)	95	5	
	Contemporary	2	17	30
	Percentage (%)	4	35	61
Total(130 structures):	number of buildings	79	21	30
	Percentage (%)	61	16	23

In the settlement, 45 buildings were located on low-slope land, 46 on medium slope, and 39 on highly-sloped land. The slope conditions were found to have an impact on the formation of building designs that are in harmony with the topography. When assessing the use of natural landscapes to enhance energy efficiency in buildings, it was found that 91 out of 130 buildings incorporated "energy efficient landscaping," while the remaining 39 did not utilize any landscape elements.

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Conflict of Interests
The Author(s) declare(s) that there is no conflict of interest.

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